F A C T

Department of Energy Lessons Learned Program

S H E E T **Tips for Writing Lesson Learned Documents**

September 2000

Introduction

Why should we document our lessons learned?

- To transfer what was learned at one facility or operation to another facility
- To prevent recurrence and improve operations
- To capture information for use in work planning, new project planning, daily safety reminders, future initiatives
- To provide feedback and support continuous improvement initiatives.

Documented, accessible, and well-written lessons learned will help future operations. These tips can help you determine which lessons learned should be documented, and how to write better lessons learned documents. They supplement the guidance for the Lessons Learned Template in DOE-STD-7501-99, *The DOE Corporate Lessons Learned Program*, and represent years of experience of lessons learned professionals from across the Department of Energy. They are not intended to constrain the individual author. Attached is the DOE Standard 7501 Lessons Learned Template with a description of all data elements, and an illustrative before-and-after lessons learned document with comments.

Is a Lessons Learned Document Needed?

There are many different sources of information for lessons learned documents. These sources should be reviewed and screened for potential applicability. The following are examples of sources of lessons learned:

- Daily activities
- Occurrence and incident reports
- Assessment activities
- Employee concerns
- Injury and illness reports
- Operational Readiness Reviews
- Management Reviews
- PAAA noncompliance reports
- Technical periodicals
- Project completion evaluations
- Performance/process improvement initiatives

Sources of lessons learned should be reviewed for information on specific incidents, general experience, and potential trends over time or across multiple organizations and facilities.

Preparing a Lesson Learned Document

Prior to writing a lessons learned document, evaluate the following basic considerations:

- Who is the audience?
- Is this information important?
- How will the information be used?
- Is the information preliminary or conclusive
- Can the information be validated for factual accuracy?
- Should the reader take any specific actions?

It is important to consider not only the immediate use of lessons learned information, but also how the lesson learned can be used in the long-term as a historical document

Writing Tips

The Lesson Learned Template (found in DOE Lessons Learned Standard, DOE-STD-7501-99) provides guidelines for writing a lesson learned document. These tips supplement those guidelines.

General Tips:

- Use the reader's language
  - Use technical terms only when necessary
  - Use appropriate language, avoid the use of slang
  - Minimize the use of acronyms. When they are absolutely necessary, spell out acronyms on the first appearance.
- Write in conversational language using active verbs.
- Avoid long or cumbersome sentences.
- Ensure objects and pronouns are clear.
- Avoid the use of personal names or manufacturer/vendor names.
- If the information is preliminary, tell the reader and provide additional updates and information when available.
- Verify the sensitivity of the information
  - Obtain classification reviews
  - Avoid vendor liabilities, ownership, copyright issues.
- Check for similar events which might indicate a trend
- Review the primary elements of the lesson learned document for consistency
- Ensure each of the elements tells the same story

Specific Template Items:

The Title and Lesson Learned Statement must get the reader's attention. The reader should feel that this is something they **need** and **want** to know.

Title:
- Make it short . . . but tell the whole story. Usually the Title is displayed when referencing the lessons learned document.
- Be specific about the incident or the situation; avoid generic terms

Lessons Learned Statement:
- Write brief, to the point statement(s) about what was learned
- Make this the primary theme for the remainder of the lesson learned document
- Ensure the statement is not too narrow
- Relate the lesson to other types of job functions and to other organizations if applicable
- Point out how the same situation could occur in a different environment.

Discussion:
- Briefly summarize the events which led to the initiation of the lesson learned document
- Be selective, don't overwhelm the reader
- Stick to the **pertinent** facts
- Provides sources for additional information in the *References*
- Use caution when citing vendor names
- Avoid reiterating insignificant details from the event report
- Include dates and locations only if necessary to understand the lesson learned.

Analysis:
- Summarize the results of any analysis that was performed
- Avoid judgmental statements
- Provide only actual facts
- Use results from the causal analysis, critique, or investigation
- Provide specific causes, if known.

Recommended Actions:
- Direct readers toward specific actions taken, planned, or recommended as related to the lesson learned
- Make specific action oriented recommendations
- Avoid vague, sweeping statements
- Consider the need for preventive actions to prevent a negative situation from recurring
- Look broader than the specific incident
- Identify improvement actions to encourage implementing good practices.

Keywords:
- Identify key concepts or phrases related to the lesson learned
- Select terms that will enhance text searching capabilities.

References:
- Include any citations to regulations or Orders which can be used to emphasize the lesson learned

Final Review

Review the lesson learned document after it has been written This review should look at the following areas:
- Factual accuracy of the information
- Determination of the priority descriptor
- Determination of the applicability and the need for required actions
- Recommended audience
- Dissemination approach.

The following questions are helpful in completing the review prior to dissemination of the lesson learned document:
- Does the information effectively communicate the message?
- Will the information be value-added?
- Is the information technically accurate and have all necessary approvals been obtained?
- Can the information be used today – and in the future?

Need Help?

The Society for Effective Lessons Learned Sharing (SELLS) has established a network of lessons learned coordinators who will provide assistance and mentoring support. For more information, contact one of the following SELLS members:

John Bickford
Fluor Hanford, Inc.
Telephone: (509) 373-7664
E-Mail: John_C_Bickford@rl.gov

Bruce Breslau
DOE/EH-21
Phone: (301) 903-7343
E-Mail: bruce.breslau@eh.doe.gov

Thomas S. Rotella, P.E.
DOE/DP-45
Phone: (301) 903-2649
Email: thomas.rotella@ns.doe.gov

Earl Hughes
DOE/EH-3
Telephone: (202) 586-0065
E-Mail: earl.hughes@eh.doe.gov

DOE Lessons Learned Program Fact Sheets, by the Society for Effective Lessons Learned Sharing (SELLS), are available from the DOE Lessons Learned Web Site:
Http://tis.eh.doe.gov/ll

DOE Lessons Learned Template

Title: _____

Date: _____

Identifier: _____

Lessons Learned Statement: _____

Discussion of Activities: _____

Analysis (May be incorporated into the Discussion): _____

Recommended Actions: _____

Estimated Savings/Cost Avoidance (if applicable): _____

Priority Descriptor: _____

Work / Function(s): _____

User-Defined Category: _____

Hazard(s): _____

ISM Core Function(s): _____

Originator: _____

Contact: _____

Authorized Derivative Classifier: _____

Reviewing Official: _____

Keywords: _____

References: _____

Lessons Learned Template - Field Descriptions

Title:	Title of the lesson learned.
Date:	Date the lesson learned was issued.
Identifier:	Unique identification number to assist in referencing a lesson learned that includes calendar year, operations office identifier, organization or field/area office/contractor identifier, and a sequential number (e.g., 1995-CH-BNL-0019; 1995-ID-LITCO-0118).
Lessons Learned Statement:	Statement that summarizes the lesson(s) that was learned from the activity.
Discussion of Activities:	Brief description of the facts which resulted in the initiation of the lesson learned.
Analysis:	Results of any analysis that was performed, if available.
Recommended Actions :	A brief description of management-approved actions which were taken, or will be taken, in association with the lesson learned.
Estimated Savings/Cost Avoidance:	If the lesson learned is implemented, an estimate of the savings from the application of a good work practice or the costs avoided from the prevention of a similar event.
Priority Descriptor:	A descriptive code that assigns a level of significance to the lesson. Options include Red/Urgent, Yellow/Caution, Blue/Information, Green/Good Work Practice.
Work/Function(s):	The work or function(s) to which the lesson applies. Enter all that apply. See listing.
User-Defined Category:	Space for organizations to include categories for internal use.
Hazard(s):	Hazards this lesson applies to or that were present in the original situation. See listing.
ISM Core Function(s):	ISM Core Functions this lesson applies. See listing.
Originator:	Name of the originating organization or contractor.
Contact:	Name and phone number of individual to contact for additional information.
Authorized Derivative Classifier:	Name of individual who determined that the lesson learned does not contain classified information. (Not required for lessons submitted by unclassified facilities.)
Name of Reviewing Official:	Name of Reviewing Official who determined that the lesson learned did not contain Unclassified Controlled Nuclear Information (UCNI). (Not required for facilities which have no UCNI.)
Keywords:	Word(s) used to convey related concepts or topics stated in the lesson.
References:	References such as DOE Orders, Programs (e.g., Standards/ Requirements Identification Document program), Standards, Occurrence Report numbers, etc.

Lessons Learned Categories

These bins are intended to help lesson creators assign categories to their products so lesson users can find information focused on their needs. The three sets of bins (Work/Function, Hazard, and ISM Core Function) provide several avenues for zeroing in on applicable lessons. Some of these bins are narrow (Hoisting and Rigging, Mechanical Injury) and some are broader conceptual areas (Authorization Basis, Energy Conservation, Environmental Release). This division is meant to help work planners looking for specific items, to help foremen looking for training anecdotes, and to help managers looking for big-picture lessons. The Work/Function and Hazard bins were developed by the Lessons Learned Process Improvement Team and extended by SELLS after several years of experience, and are open for further improvement and extension.

Lessons Learned Hazards

Confined Space
Electrical/NEC
Elevated Work / Falling Objects
Environmental Release
Ergonomics / Lifting
Excavation and Trenching
Fire / Smoke / NFPA
Firearms and Explosives
Lasers
Natural Phenomena
Other
Personal Injury / Exposure
- Airborne Materials
- Ambient Temperature Extremes
- Asbestos
- Beryllium
- Hazardous Material (General)
- Infectious Agents
- Mechanical Injury (Striking/Crushing)
- Noise
- Other
- Radiation / Contamination
- Slips and Tripping
- Toxic Material

Plants/Animals/Insects
Power Tools
Pressurized Systems
Radiological Release
Traffic
Weather Related

ISM Core Functions

Define Work
Analyze Hazards
Develop/Implement Controls
Perform Work
Feedback and Improvement

Work/Function

Alternate Fuels
Authorization Basis
Business and Support Services
Conduct of Operations
- General
- Configuration Management
- Lockout/Tagout
- Procedure Development
- Procedure Adherence
- Work Planning
- Work Control

Construction
Criticality
Decontamination and Decommissioning
Demolition
Driving
Emergency Management
Energy Conservation
Engineering and Design
- Nuclear
- Non-Nuclear

Environmental Protection
- General
- Environmental Sampling
- Releases
- RCRA Management
- Underground Storage Tanks
- NEPA Management
- TSCA Management

Environmental Restoration
Excavation
Fire Protection
Hoisting and Rigging
Human Factors
Human Resources
Information Technology
Inspection and Testing
Laboratory Experimentation
Maintenance
- Electrical
- Facility
- HVAC
- Instrumentation and Control
- Mechanical
- Power Distribution and Utilities
- Roads and Grounds
- Structural
- Safety Systems
- Heavy Equipment
- Vehicle

Machining and Fabrication
Management
Material
- Handling
- Storage

Occupational Safety and Health
- General
- Personnel Protective Equipment

Operations
- Facility
- Heavy Equipment

Other
Packaging and Transportation
Quality
Radiation Protection
Research and Development
Safeguards and Security
Safety Design
Training and Qualifications
Waste Management
Waste Remediation
Welding, Burning, Hot work
Well Drilling

Sample Lessons Learned Document with Corrections and Comments.

Before	After	Comments
Lessons Learned Statement		
Employees should not modify any Facilities property.	Do not enter an area to investigate an abnormal release of gas or fluid even if you believe it is not hazardous. Gases that displace oxygen can accumulate to fatal levels within seconds! Employees should not modify facility property or equipment without authorization. Unapproved changes may create new/undocumented hazards. Effective application of the Integrated Safety Management Core Function *Analyze Hazards/controls* could prevent similar events.	Brief, to the point statements General Comments: Write in conversational language using active voice: recommend vs. make recommendation, inspect vs. perform inspection of. Avoid long or cumbersome sentences. Ensure objects and pronouns are clear
Discussion of Activities		
Summary None provided	**Summary** An uncontrolled release of Nitrogen gas in a laboratory created an asphyxiation hazard.	Provide a short topic sentence (bottom line)
Details On April 25, 1997, an employee heard a hissing sound coming from a vacant lab, saw an open 1/4" house nitrogen line leaking gas and called the Incident Commander (IC). The lab doors were closed. IC coordinated a response to address the leak. HazMat Team Members placed oxygen monitors in the hall area (readings in the hallway were near normal). The Team Members entered the room, each wearing a self-contained breathing apparatus, to investigate the release and monitor the inside of the room. Handheld oxygen monitors indicated 0% oxygen a few feet into the lab. The HazMat Team acquired a valve, re-entered the lab and stopped the nitrogen release. Normal building ventilation cleared the hazard.	**Details** An employee heard a hissing sound coming from a vacant lab, saw an open nitrogen line leaking gas, and called the site incident commander. On-scene personnel closed the lab doors and initiated emergency response actions. Oxygen readings on monitors placed in the hall outside the lab by HazMat responders were near normal. HazMat personnel entered the room wearing self-contained breathing apparatus. Hand-held oxygen monitors indicated 0% oxygen a few feet into the lab. The HazMat personnel installed a valve on the leaking line and stopped the nitrogen release. Normal building ventilation restored normal oxygen levels in the lab.	Details of dates, room numbers or facility names are not necessary. Provide a brief description of the activity in progress when the improvement, enhancement, efficiency, or incident was noted.

Sample Lessons Learned Document with Corrections and Comments.

Before	After	Comments
Analysis		
Inspection of the piping clearly indicated that someone had cut out a component (probably a regulator / shut-off valve combination) from the "House" nitrogen system. This was probably not seen as a hazard because that section of the piping system had been valved off by Facilities, therefore, removal of the component caused no immediate release. Later, when Facilities re-activated that section of the piping by customer request, the release occurred. Note that the isolation valve for the system was some distance away from room 271, on another floor and in an equipment chase. Therefore, when workers opened the valve, they were unaware that a release was occurring. The component that had been removed had ¼" pipe threads available on the "source" end and the response team was able to connect a valve and close it. The other side of the line where the component had been removed was merely a copper line that had been hacksawed off.	Piping inspection clearly indicated that someone had cut out a component (probably a regulator / shut-off valve combination) from the nitrogen system. This modification was not seen as a hazard because the removed section of piping was in a part of the system that had been valved off by Facilities personnel. Hence, a release did not occur when the component was removed. Later, the section of piping was re-activated and the release occurred. The isolation valve for the system was on another floor in an equipment chase room some distance from the lab. Therefore, when workers opened the valve to reactivate the section of piping, they were unaware that a release was occurring. The component that had been removed had pipe threads on one end, allowing the response team to connect a valve and close it. The other side of the line where the component had been removed was a copper line that had been sawed off. Several Core Functions of the Integrated Safety Management System could have prevented this incident had they been more effective: Define Scope of Work - Facility management integrates ES&H activities into work planning. A closer review of the work for safety issues might have revealed the open ended piping configuration. Analyze Hazards and Implement Controls - Major Subcontractors develop and maintain a graded approach to work planning based on risk, complexity, and routine versus non-routine nature of work activities. Modifying the piping by removing a valve and leaving an open-ended line creates a need for additional controls based on the risk involved.	Include a short analysis, do not include judgmental statements i.e., poor, ineffective, inadequate. Provide only actual facts Tie to ISM expectations, if appropriate. Code ISM categories even when not discussed explicitly.

Sample Lessons Learned Document with Corrections and Comments.

Before	After	Comments
Recommended actions		
Facilities' piping belongs to Facilities and should not be tampered with by employees without Facilities review/approval. Facilities must also perform the work. If you hear a large volume release do not enter the lab to investigate (even if you believe it's nitrogen and do not perceive it to be a hazardous scenario). A very low percentage of oxygen can be fatal in seconds! This scenario proves that an uncontrolled release of "house" nitrogen into a standard sized/ normally ventilated lab can rapidly present asphyxiation hazard. After only about 20 to 30 minutes of this uncontrolled release, the lab was very effectively purged of air and represented a lethal hazard. It should be noted that the amount of oxygen in the air that we breathe is ~20.8%. The amount of oxygen that OSHA considers to be oxygen deficient is 19.5%. Thus, breathing 0% {or near 0%} oxygen in nitrogen can cause unconsciousness in seconds. Death will follow unless an appropriate rescue and treatment is given.	Review configuration control procedures and/or work control procedures to ensure directions clearly describe how to authorize work prior to performing system maintenance or reconfiguration.	Recommended actions to prevent recurrence of the event. Avoid vague sweeping statements or long recapitulation of the event.

Sample Lessons Learned Document with Corrections and Comments.

Before	After	Comments
Identification data		
Subject: Blue Alert: Nitrogen Release due to Tampering with Facilities Piping ES&H Lessons Learned Program Sandia National Laboratories Albuquerque, NM. 87185-1177 Compliance and Metrics Department, 7571, MS 1177, (505) 844-6523 Title: Nitrogen Release due to Tampering with Facilities Piping Identifier: Formal Lessons Learned Report, 1998-KO-SNL-0010 Date: December 18, 1998	Originator: ES&H Lessons Learned Program Sandia National Laboratories Albuquerque, NM. 87185-1177 Compliance and Metrics Department, 7571, MS 1177, (505) 844-6523 Priority: Blue/Information Title: Nitrogen Release due to Tampering with Facilities Piping Keywords: facilities, nitrogen, release, piping, asphyxiation Work/Function Categories: Conduct of Operations: Work Control Conduct of Operations: Lock and Tag Human Factors Maintenance: Facility Hazard: Other ISM Category: Define Work Analyze Hazards Develop/Implement Controls Identifier: Formal Lessons Learned Report, 1998-KO-SNL-0010 Date: December 18, 1998 Contact: Jane Doe, SNL Lessons Learned Coordinator	Ensure a contact is listed for further information. Include the DOE Activity, Function, and Hazard codes to facilitate future retrieval form the Lessons Learned database.

SAMPLE GOOD PRACTICE LESSONS LEARNED

Lessons Learned Template Item	Comments
Lessons Learned Statement	
Self-checking programs are a simple tool to help employees work safely and perform tasks properly. Feedback and mentoring from supervisors, managers, and other employees enhances self-checking and encourages broad application of self-checking techniques to many types of work activities.	Write in conversational language using active verbs, (i.e., recommend vs. make recommendation, inspect vs. perform inspection of). Avoid long or cumbersome sentences. Ensure objects and pronouns are clear.
Discussion of Activities and Analysis	
Adverse events occur where the wrong component is removed from a system, electrical power is not deenergized before work starts, the wrong system is worked on, or adjacent activities distract a worker. Additionally, errors by those who typically do not manipulate controls and/or systems, such as managers, designers, procedure writers, and work package preparers, may not be immediately apparent, but may eventually result in errors. An effective self-checking program containing the following elements can help prevent an adverse event/s: ! Defined self-checking techniques ! Support of the self-checking principles and techniques by managers and supervisors ! Coaching by first-line supervisors or managers to reinforce the use of self-checking on the job ! Training to communicate the principles and techniques of self-checking ! Incorporation of the principles and techniques of self-checking into a broad range of activities, especially existing training programs and procedures	Brief, to-the-point statements. A good practice can be developed from a single event or from a historical (cumulative) perspective. Provide a short topic sentence (bottom line). Include a short analysis. Do not include judgmental statements, (i.e., poor, ineffective, inadequate). Provide only actual facts. A separate **Analysis** section may or may not be appropriate.
Recommendations	
The following four steps should be included in all self-checking techniques: ! **STOP:** Pause before performing a task to enhance attention to detail. This is the most important step of any self-checking technique. The simple act of stopping increases the likelihood of performing the task correctly. Attempt to eliminate current or potential distractions. ! **THINK:** Understand what is to be done *before* manipulating any equipment and identify the correct component, train, unit, etc., before taking any action. Use all the senses that apply, e.g., visual, audible, and touch. Question the situation by trying to identify all available or unavailable information to the task. Determine if the task is appropriate for the given conditions. Consider the expected responses and indications associated with the intended action, e.g., flow noise, breaker noise, meters, recorders, radiation levels, and vibration. Decide what actions (immediate or delayed) to take should expected responses not occur. Obtain answers to any remaining questions or concerns.	Provide a brief description of the enhancement, good practice, and/or efficiency that was noted/observed.

SAMPLE GOOD PRACTICE LESSONS LEARNED

Lessons Learned Template Item	Comments
CAUTION: DO NOT PROCEED IN THE FACE OF UNCERTAINTY. ! **ACT:** First, without losing eye contact, physically touch the component without actuating it. Confirm the correct component, train, unit, etc., while touching it; compare the component or device label to the in-hand checklist, procedure, drawing, or memory (if necessary). Depending on the situation, name the component out loud to enhance one's attention to detail. Finally, physically perform the intended action without losing hand contact established earlier (use of special tools may be appropriate if radiological, chemical, heat, or electrical hazards are present). ! **REVIEW:** Verify that the actual response is the expected response. If an unexpected response is obtained (observed), take action as previously determined. Ensure actions are conservative.	
Estimated Savings/Cost Avoidance:	Enter if appropriate.
Identification Data	
Priority Descriptor: GREEN/Good Work Practice Function/Work Categories: (as appropriate) Hazard (as appropriate) ISM Category: (as appropriate) Identifier: (as appropriate) Originator: (as appropriate) Contact: (Site) Lessons Learned Coordinator; (000)111-3434; FAX (000)111-4434; e-mail <mailto:Lessons_Learned_Sitewide@xxx.gov Name of Authorized Derivative Classifier: (Ensures lesson is unclassified) Name of Reviewing Official: (Ensures no UCNI) Keyword(s): self-checking, etc References: (as appropriate)	Fill in as appropriate; See attached lists.